

CLAIMS

1. Method for the manufacture of an optical cable (1), comprising the step of incorporating at least one optical fibre (3) in an extruded polymer material in contact with a strand-like element (4) characterized in that said step of incorporation in a polymer material comprises the steps of:

- arranging said optical fibre (3) along an open helix trajectory, and
- applying to said optical fibre (3) a maximum local torsion of between 0.05 turns/m and 1.5 turns/m.

2. Method according to Claim 1, characterized in that said step of incorporation in a polymer material comprises the step of applying to said optical fibre (3) a maximum local torsion of between 0.1 turns/m and 1 turn/m.

3. Method according to Claim 1, characterized in that said step of incorporation in a polymer material comprises the step of applying to said optical fibre (3) a zero mean torsion.

4. Method according to Claim 1, characterized in that said step of incorporation in a polymer material comprises the steps of:

- feeding said strand-like element (4) through an extrusion zone (77) in a predetermined feeding direction;
- feeding said optical fibre (3) through said extrusion zone at a predefined distance from said strand-like element (4), and
- supplying said polymer material into said extrusion zone (77) so that said polymer material envelopes said strand-like element and said optical fibre.

5. Method according to Claim 1, characterized in that said step of incorporation in a polymer

material comprises the step of incorporating between 2 and 24 optical fibres in said polymer material.

6. Method according to Claim 4, characterized in that said step of arranging said optical fibre (3) along an open helix trajectory comprises the step of imparting an alternate twist to said strand-like element (4).

7. Method according to Claim 4, characterized in that said step of feeding said optical fibre (3) through said extrusion zone comprises the steps of torsionally constraining (62) said optical fibre upstream of said extrusion zone (77) at a predetermined distance from said extrusion zone and said step of applying a maximum local torsion to said optical fibre (3) comprises the step of adjusting said distance of said constraint from extrusion zone in relation to said maximum local torsion.

8. Method according to Claim 6, characterized in that said step of imparting an alternate twist to said strand-like element (4) comprises the step of imparting to said strand-like element a predetermined angular speed ( $\omega$ ) and a predetermined maximum angle of torsion ( $\alpha'_{\max}$ ) and said step of feeding said strand-like element comprises the step of displacing said strand-like element at a predetermined feeding speed ( $v$ ), said step of applying a maximum local torsion to said optical fibre (3) comprising the step of adjusting said angular velocity, said maximum angle of torsion or said feeding speed in relation to said maximum local torsion.

9. Method according to Claim 1, characterized in that said step of arranging said optical fibre (3) along an open helix trajectory comprises the step of associating a spatial inversion pitch ( $P$ ) of between 0.5 m and 5 m with said trajectory.

10. Method according to Claim 4, in which said

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step of feeding said optical fibre (3) into said extrusion zone (77) comprises the step of conveying said optical fibre towards said extrusion zone by means of a support (69) which is provided with channels (71) and through which said strand-like element (4) passes centrally.

11. Optical cable (1) for telecommunications, comprising a substantially strand-like central element (4), at least one optical fibre (3) and a layer of polymer material (5) which is substantially devoid of discontinuities and incorporates said central element (4) and said optical fibre, said optical fibre (3) being arranged along an open helix trajectory and having a torsion chosen so that the PMD measured on said cable is less than 110% of the PMD measured on a non-cabled optical fibre of the same type.

12. Cable according to Claim 11, in which said optical fibre (3) has, along the respective open helix trajectory, a maximum local torsion of between 0.05 turns/m and 1.5 turns/m.

13. Cable according to Claim 11, in which said optical fibre (3) has, along the respective open helix trajectory, a maximum local torsion of between 0.1 turns/m and 1 turn/m.

14. Cable according to Claim 11, in which said optical fibre (3) has, along the respective open helix trajectory, a zero mean torsion.

15. Cable according to Claim 11, comprising a number of optical fibres ranging between 2 and 24.

16. Cable according to Claim 11, in which said optical fibre (3) has, along the respective open helix trajectory, a maximum winding angle ( $\alpha_{\max}$ ) which is less than or equal to, in terms of absolute value,  $360^\circ$  and a maximum angle of torsion ( $\beta_{\max}$ ) smaller than, in terms of absolute value, said maximum winding angle.

17. Cable according to Claim 16, in which said

maximum angle of torsion ( $\beta_{\max}$ ) is between  $90^\circ$  and  $270^\circ$ .

18. Cable according to Claim 11, in which a thickness of homogenous polymer material greater than or equal to 0.10 mm is provided around said optical fibre (3).

19. Cable according to Claim 11, in which said open helix trajectory has an inversion pitch (P) of between 0.5 m and 5 m.

20. Cable according to Claim 11, comprising a plurality of optical fibres (3) defining a ring of optical fibres which are equidistant from each other and arranged at the same distance from an axis (10) of said cable (1).

21. Cable according to Claim 20, in which said distance of said optical fibres (3) from said axis (10) is between 0.4 mm and 1.2 mm.

22. Cable according to Claim 11, comprising a plurality of optical fibres (3) defining a first ring (15) of optical fibres which are equidistant from each other and arranged at a first distance from an axis (10) of said cable (1) and a second ring (16) of optical fibres which are equidistant from each other and arranged at a second distance from said axis (10) which is greater than said first distance.

23. Cable according to Claim 22, in which said first distance is between 0.4 mm and 0.8 mm and said second distance is between 0.9 mm and 1.2 mm.

24. Cable according to Claim 11, in which said layer of polymer material (5) has a thickness of between 0.9 mm and 1.5 mm.

25. Cable according to Claim 11, in which said central element (4) has a diameter of between 0.5 mm and 0.7 mm.

26. Cable according to Claim 11, in which said optical fibre (3) has an external diameter of less than 400  $\mu\text{m}$ .

27. Cable according to Claim 11, in which said optical fibre (3) has an external diameter of less than 270  $\mu\text{m}$ .

28. Cable according to Claim 11, in which said  
5 polymer material has a bending modulus of between 20  
Mpa and 70 Mpa, a Shore D hardness factor of between 15  
and 70 and a Melt Flow Index of between 5 and 15.

29. Cable according to Claim 11, comprising a sheath (6) arranged around said layer of polymer material (5), said sheath (6) being made of a material being chosen from the group comprising polyalkylene terephthalates, polyolefins and polyamides.

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